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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,138	12/30/2003	Heung-Yong Ha	9717.24US01	1780

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EXAMINER	
CHEN, BRET P	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/751,138	HA ET AL.	
	Examiner	Art Unit	
	Bret Chen	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5 and 7-23* is/are pending in the application.

4a) Of the above claim(s) *15,16 and 18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,7-14,17 and 19-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1, 3-5, 7-14-23 are pending in this application. The Notice of Allowance dated 1/15/09 has been withdrawn in favor of the proposed art rejection below. The examiner regrets the inconvenience.

Claims 15-16, 18 are withdrawn from consideration as being directed to a nonelected invention.

Claim Rejections - 35 USC § 112

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 7, the ranges disclosed are confusing. The examiner has interpreted the claim as $1.0x10^{-3}$ to $1.0x10^{-6}$ Torr.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohzu et al. (6,416,898).

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes (abstract) which coats a polymer electrolyte membranes with a proton-conducting inorganic thin film for fuel cells (col.4 lines 10-29). The inorganic thin film can be silicon oxide (SiO_2), titanium oxide (TiO_2), or/and aluminum oxide (Al_2O_3) (col.4 lines 53-61).

Regarding claim 3, Ohzu teaches a fluorocarbon sulfuric acid polymer and a fluorocarbon carbonic acid polymer (col.7 lines 40-51).

Regarding claim 17, Ohzu teaches forming a membrane electrode assembly (col.8 lines 38-49, col.12 lines 24-25 and Figure 2).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898).

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide as taken above. However, the reference fails to specifically teach the appropriate thickness.

Ohzu teaches that the thickness of the inorganic film is specifically 1 to 70% of the thickness of the organic compound film (co.5 lines 59-67) which is in the range of 5-150 um (col.4 lines 52-53). A simple calculation of 50% of a 100 um would result in a 50 nm thickness

which is within the claimed range. Overlapping ranges are *prima facie* evidence of obviousness. It would have been obvious to one having ordinary skill in the art to have selected the portion of Ohzu's thickness that corresponds to the claimed range.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Zuber et al. (6,156,449).

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide as taken above. In one embodiment, a second proton-conducting inorganic films can be utilized (col.4 lines 16-29) for use of increasing conductivity and chemical resistance (col.4 lines 52-65). However, the reference fails to teach a proton-conducting ionomer solution.

Zuber teaches of forming a polymer electrolyte membrane layer by using an ionomer solution (col.3 lines 34-42). It would have been obvious to utilize an ionomer solution in Ohzu with the expectation of success because Zuber teaches the conventionality of using same to form a polymer electrolyte membrane layer.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and further in view of Morosanu.

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes (abstract) which coats a polymer electrolyte membranes with a proton-conducting inorganic thin film for fuel cells (col.4 lines 10-29). The inorganic thin film

can be silicon oxide (SiO_2), titanium oxide (TiO_2), or/and aluminum oxide (Al_2O_3) (col.4 lines 53-61). However, the reference fails to teach plasma CVD.

Debe teaches of forming a membrane electrode assembly comprising an ion conducting membrane and one or more electrode layers for use in fuel cells (abstract). Specifically, inorganic material such as oxides (col.12 lines 52-67) can be deposited by CVD or sputtering (col.13 lines 45-62). Morosanu teaches that chemical vapor deposition can include plasma CVD processes. It would have been obvious to utilize a plasma CVD process to deposit the oxide films in Ohzu's process with the expectation of obtaining similar results given the teachings of Debe and Morosanu which teach the conventionality of depositing oxide films by plasma CVD.

Claims 4-5, 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and Morosanu and further in view of Kwok et al. (5,271,972).

Ohzu/Debe/Morosanu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by plasma CVD as taken above. However, the references fail to teach a metallorganic compound with oxygen.

Kwok discloses a method for depositing a silicon oxide film by PECVD by reacting TEOS, oxygen, and a carrier gas in the presence of a plasma (col.3 lines 19-47). It would have been obvious to utilize an organometallic compound with oxygen in the process of

Ohzu/Debe/Morosanu with the expectation of success because Kwok teaches the conventionality of doing same.

Regarding claim 5, Kwok teaches TEOS (col.3 line 22).

Regarding claim 8, Kwok teaches a power of 200-400W (col.3 line 28).

Regarding claim 9, Kwok teaches a pressure of 1-50 Torr (col.3 line 24).

Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and Morosanu and further in view of Kwok et al. (5,271,972) and Izu et al. (5,670,224).

Ohzu/Debe/Morosanu/Kwok discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by plasma CVD using a metallorganic compound with oxygen as noted above. However, the references fail to teach an argon plasma pretreatment step.

Izu teaches of forming a modified silicon oxide coating by using microwave CVD (col.1 lines 15-20) in which an argon pretreatment step is utilized with the expressed purpose of enhancing barrier properties (col.7 lines 19-46). It would have been obvious to utilize the argon pretreatment step in the process of Ohzu/Debe/Morosanu/Kwok with the expectation of obtaining the desired film properties including barrier characteristics.

Regarding claims 11-12, these issues have been addressed above.

Claims 7, 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Sproul (5,789,071).

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes (abstract) which coats a polymer electrolyte membranes with a proton-conducting inorganic thin film for fuel cells (col.4 lines 10-29). The inorganic thin film can be silicon oxide (SiO_2), titanium oxide (TiO_2), or/and aluminum oxide (Al_2O_3) (col.4 lines 53-61). However, the reference fails to teach sputtering.

Sproul teaches of forming oxide coatings by sputtering (title) using an aluminum target having a purity of 99.9% at a pressure of 28 mTorr (col.12 lines 37-44). The power can be from 40-280 watts (col.12 lines 59-62). It would have been obvious to utilize sputtering in the process of Ohzu with the expectation of success because Sproul teaches the conventionality of depositing oxide films by sputtering.

Regarding claim 7, Sproul teaches a purity of 99.9% at a pressure of 28 mTorr (col.12 lines 37-44).

Regarding claim 21, Sproul teaches a power of 40-280 watts (col.12 lines 59-62)

Regarding claim 22, Sproul teaches a pressure of 28 mTorr (col.12 lines 37-44).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Sproul (5,789,071) and further in view of Izu et al. (5,670,224).

Ohzu/Sproul discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with

an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by sputtering as taken above. However, the references fail to teach an argon plasma pretreatment step.

Izu teaches of forming a modified silicon oxide coating by using microwave CVD (col.1 lines 15-20) in which an argon pretreatment step is utilized with the expressed purpose of enhancing barrier properties (col.7 lines 19-46). It would have been obvious to utilize the argon pretreatment step in the process of Ohzu/Sproul with the expectation of obtaining the desired film properties including barrier characteristics.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bret Chen whose telephone number is (571)272-1417. The examiner can normally be reached on 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bret Chen/
Primary Examiner, Art Unit 1792
4/9/09